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(12) **United States Patent**  
**Smith et al.**

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(54) **STAVE AND BRICK CONSTRUCTIONS  
HAVING REFRACTORY WEAR MONITORS  
AND IN PROCESS THERMOCOUPLES**

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*F27D 1/04* (2013.01); *F27D 21/0021*  
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(58) **Field of Classification Search**

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See application file for complete search history.

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(56)

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**ABSTRACT**

A stave/brick construction, comprising: a stave having a plurality of ribs and a plurality of channels, wherein a front face of the stave defines a first opening into each of the channels; a plurality of bricks wherein each brick is insertable into one of the plurality of channels via its first opening to a position, upon rotation of the brick, partially disposed in the one channel such that one or more portions of the brick at least partially engage one or more surfaces of the one channel and/or of a first rib of the plurality of ribs whereby the brick is locked against removal from the one channel through its first opening via linear movement without first being rotated; and one or more wear monitors and/or thermocouples, wherein each wear monitor and thermocouple is disposed through or adjacent to the stave and/or one or more of the bricks.

**21 Claims, 8 Drawing Sheets**

